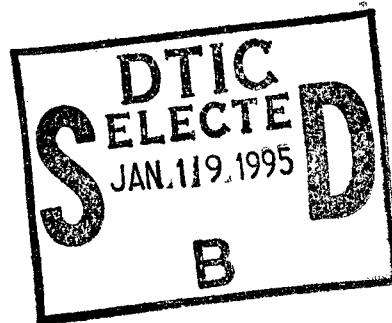


NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



THESIS

BENEFITS DERIVED FROM CAPTURING
CONSUMABLE SUPPLY COSTS BY DRG AS
AN INPUT TO PHYSICIAN PRACTICE
PATTERN PROGRAMS IN MILITARY
TREATMENT FACILITIES

by

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December, 1994

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PROGRAMS IN MILITARY TREATMENT FACILITIES

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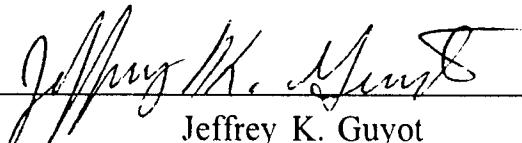
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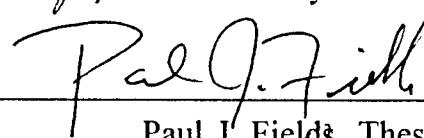
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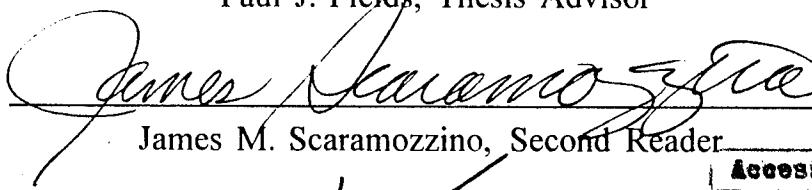
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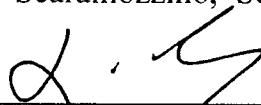
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ABSTRACT

The study examines the benefits that can be derived by Military Treatment Facilities from capturing consumable supply costs by Diagnostic Related Groups. Civilian hospitals are capturing supply costs at the patient level using physician and Diagnostic Related Groups specific cost accounting methods. Cost data captured in this manner can be combined with severity of illness adjusted clinical performance data, available through the facility's utilization management program, thus providing data required to execute a physician practice pattern program. Direct financial benefits can be derived from a physician practice pattern program. Indirect benefits to product line decisions and materials management can be derived from this type of program as well. Military Treatment Facilities can derive the same benefits as civilian hospitals by adopting a physician and Diagnostic Related Group specific cost accounting system. When this type of accounting system is combined with existing utilization management programs an effective physician practice pattern program can be executed and the benefits of this type of program may be realized.

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I. INTRODUCTION

A. BACKGROUND

This research assesses the benefits that could be accrued by the Department of Defense if consumable supply costs were captured in Military Treatment Facilities by inpatient Diagnostic Related Groups as input to reducing variation in physician practice patterns.

B. OBJECTIVES

The objective of the research is to assess the benefits to Military Treatment Facilities of capturing consumable supply costs by inpatient Diagnostic Related Groups. The assessment of the benefits associated with collecting this data is critical to Department of Defense Treatment Facilities if physician practice pattern and variance reduction programs are to function at effective levels. Benefits accrued to materials management functions and product line decisions from an effective physician practice pattern program are also examined.

C. RESEARCH QUESTIONS

The questions examined are as follows:

- 1) Do physician practice pattern programs within civilian hospitals, fed by consumable supply costs captured by inpatient Diagnostic Related Group, have potential benefits?
- 2) What other management areas can benefit from these physician practice pattern programs and from collecting consumable supply costs by inpatient Diagnostic Related Group?
- 3) Are there physician practice pattern programs currently in development or use within the Department of Defense and Military Treatment Facilities that are comparable to civilian programs?

- 4) Can the Department of Defense benefit from collecting consumable supply costs by inpatient Diagnostic Related Groups as an input to physician practice pattern programs?

D. SCOPE, LIMITATIONS AND ASSUMPTIONS

1. Scope

The scope of the research centers on an examination of the benefits associated with Military Treatment Facilities capturing consumable supply costs by inpatient Diagnostic Related Groups for use in physician practice pattern programs. The focus of the study was formulated in this manner for a number of reasons. First, only consumable supply costs are considered since a more comprehensive examination of costs including capital equipment depreciation, labor costs and fixed overhead allocation cost capture by inpatient Diagnostic Related Group would add much more complexity to the issue than could be completed within this study. Similarities between consumable supply costs and these other cost areas should be examined in subsequent research so that comprehensive decisions may be made by hospital administrators regarding physician practice pattern programs. Second, Diagnostic Related Groups are used for this study rather than other patient diagnostic coding methods because Diagnostic Related Groups are the most commonly used form of patient coding in civilian medicine today. Finally, other management areas that could potentially benefit from collecting consumable supply costs are identified and using this data as an input to physician practice pattern programs in civilian hospitals is compared to use in Military Treatment Facilities. This comparison centers on the specific aspects of each management area, physician practice pattern programs, and potential cost savings that could be achieved.

2. Limitations

Limitations associated with the research center on three specific areas. First, the comparison of the financial benefits associated with capturing consumable supply costs in civilian and military hospitals focuses on possible cost savings rather than revenue enhancement or profit potential. Military Treatment Facilities currently lack a revenue flow other than appropriations and Third Party Insurance collections. Third Party Insurance collections are not examined as an area of interest that may benefit from collecting consumable supply costs by Diagnostic Related Group as reimbursements to Military Treatment Facilities under this plan are based on individual insurance company requirements and are not thereby effected by the underlying costs as examined by Diagnostic Related Group. Therefore, only potential cost savings accrued to management areas from a well run physician practice pattern program, utilizing consumable supply cost data by inpatient Diagnostic Related Groups, within a treatment facility are examined. Second, programs within the Department of Defense that are currently under development are examined by means of draft instructions or draft policy letters. Final versions of these documents are not available, therefore draft versions are used in some instances. Draft documents are annotated as such in the References section of this study. Third, only inpatient areas of consumable supply use are examined. Outpatient treatment area classification systems are structured in a different manner than those in inpatient areas. It is hoped by the author, however, that findings within the inpatient area will be expanded to outpatient areas through subsequent research.

3. Assumptions

A thorough working knowledge of the Department of Defense, Military Treatment Facilities and specifics of Diagnostic Related Groups is not required to read this study.

It is hoped by the author that the more simplified the reading the wider the dissemination this study will receive. It should be noted that minor assumptions contained within the study are presented as they occur in the text.

E. LITERATURE REVIEW AND METHODOLOGY

Literature reviewed for this study included current periodical articles to assess the benefits of collecting consumable supply costs by inpatient Diagnostic Related Groups and using this data as an input to physician practice pattern programs within civilian hospitals. Literature reviewed to assess the potential benefits to Military Treatment Facilities and the Department of Defense included draft instructions, policy letters, facility standard operating procedure documents and current Department of Defense periodical literature.

The methodology employed for this study begins with an examination of the direct benefits that may be accrued in civilian hospitals from collecting consumable supply costs by Diagnostic Related Groups and using this information as an input to physician practice pattern programs. The study then examines other management areas that are related to and may benefit from physician practice pattern programs that use consumable supply cost data collected by Diagnostic Related Groups. The study then examines physician practice pattern programs that are either ongoing or under development within the Department of Defense. The study also examines the potential benefits that could be accrued by other management areas in Military Treatment Facilities through comparison to other management areas, i.e., Military Treatment Facility materials management to materials management in civilian hospitals. In this manner, an assessment of the benefits of capturing consumable supply costs by Diagnostic Related Groups

and using this data as an input to physician practice pattern programs within Military Treatment Facilities may be made.

F. DEFINITIONS AND ABBREVIATIONS

Definitions of certain terms presented in the study are given as they arise. Abbreviations contained in the study are as follows: Military Treatment Facilities are MTFs; the Department of Defense is DoD; and Diagnostic Related Groups are DRGs.

Physician practice pattern programs are hereby defined as programs that focus on reducing variation in physician practice through means of reinforcement. These programs fall into many categories but have a common theme. By presenting cost information to the physician, variation in practice patterns such as ancillary test ordering patterns may be reduced. These programs range from negative feedback, as in utilization management, to positive feedback as used in practitioner profiling programs.

G. ORGANIZATION OF STUDY

The study presents a comparative examination of the benefits of capturing consumable supply costs by DRG and using this data as an input to physician practice pattern programs in civilian hospitals and in MTFs. The study first presents a background examination of DRGs and a historical review of hospital supply costing methods. The study then examines current periodicals to assess the direct benefits a physician practice pattern program may have on cost savings within a treatment facility. The study then examines the potential benefits that may be accrued in other management areas within civilian hospitals from an effective physician practice pattern program. Next, the study examines current DoD literature to assess the applicability of the civilian hospital physician practice pattern programs to MTF physician practice pattern programs. The study then analyzes the

potential benefits to other management areas within MTFs of capturing these costs and utilizing these costs as an input to physician practice pattern programs. Finally, the study presents conclusions drawn from the analysis and recommendations.

II. BACKGROUND ON DRGS AND SUPPLIES COST CAPTURE

A. INTRODUCTION

Some civilian hospitals have already discovered, and others are just now discovering, that capturing consumable supply costs by DRG has benefits. [Ref. 1] These benefits are large when these captured costs are used in physician practice pattern programs. This is so because physicians control 70% of the total dollar expended in treatment facilities. Of these costs, consumable supply costs are the most easily controlled costs in a facility. Physician practice pattern programs, fed by supply cost information, attempt to modify physician behavior to control these costs. [Ref. 2] Benefits may also be accrued to other management areas, such as product line decision making and materials management, as an output of an effective physician practice pattern program. However, in order to understand the significance of how these benefits may be derived it is necessary to understand how consumable supply costs have been historically captured in hospitals. It is also necessary to explain the significance of DRGs, i.e., what they are, how they work, and how hospitals have historically tracked costs prior to their introduction.

B. SUPPLY COST CAPTURE

Consumable supply costs in health care facilities have historically fallen into a black hole. Hospital administrators and materials managers have had little knowledge of where, how, when or on whom consumable supplies released into the inpatient system were used. This has left hospital administrators with nothing more than aggregate supply expense information, gathered at periodic intervals, on which to base decisions. This has also left materials managers scrambling to ascertain demand for consumables by means of retrospective inventory models rather than a fore-knowledge of inpatient hospital services, strategies or

patient/procedure mix changes. This lack of knowledge of where consumable supplies were used is due primarily to hospitals' prevalent use of cost-center accounting techniques. [Ref. 3]

Cost-center accounting has been practiced traditionally by both civilian and, more recently, military treatment facilities. The practice involves the recording of consumable supplies at point of transfer to a particular inpatient department, such as orthopedics. The department as a whole was viewed as the cost-center and was subsequently the last point of capture of information on supplies. This left administrators grappling with an aggregate measure of supplies used and no apparent way to tie those supplies to each individual patient admission, service or procedure other than extensive, time consuming manual techniques or complex algorithms that stepped down the costs to a particular service or procedure. [Ref. 3] This is true also of MTFs which currently use a step-down cost algorithm known as the Medical Expense and Performance Reporting System or MEPRS. [Ref. 4]

Under civilian hospitals' cost-center and MEPRS cost-pool step-down accounting methods, aggregate consumable supplies costs are stepped down or run through an algorithm to arrive at a supply cost per procedure. These algorithms involve applying the aggregate supply cost to a matrix of procedures, each with a specific weight or ratio, so that a cost per procedure is arrived at. The glaring problem with this method of cost allocation is that it produces cost assignments on the basis of average cost. Consequently, hospitals in both sectors have not been able to use this information as a meaningful input to physician practice pattern programs to modify physician behavior and control costs.

Current DoD efforts to produce a patient level cost accounting system focus on assigning an assumed cost for a procedure rather than capturing the actual costs involved in

the procedure. This, like the averaging of costs, tends to lose the physician specific data needed to run an effective physician practice pattern program. [Ref. 5]

Effective physician practice pattern programs require that information be presented or captured in such a manner that allows analysis of the individual physician's patterns, not the group as a whole. If costs are analyzed based on an average for a group of physicians, there exists no basis for identifying individual practice patterns as all costs contribute to a cost center average. This averaging of costs hides the individual physician within the group and negates any attempt to identify individual performance data. This also deprives the physician of the ability to compare himself/herself against his/her peers for the purpose of reducing variation and therefore costs. Only if true costs are captured for each individual physician can administrators, in concert with medical directors, hope to track variations in individual physician's patterns. Average costs are not sufficient to track these patterns nor are they sufficient for in-depth analysis.

C. THE RISING COST OF HEALTH CARE

The cost of health care in the United States has risen from \$42 billion in 1965 to \$912 billion in 1993. Health care costs as a percentage of Gross Domestic Product (GDP) have also risen from 5.9% to 14.6% during the same period. Health care costs are projected to continue to increase as a percentage of GDP and as a whole through the year 2000 with total U.S. health care spending exceeding \$1.631 trillion. [Ref. 6]

The costs of health care are obviously enormous. Unabated, their increase over and above national inflation averages, as represented by GDP, will continue to outstrip the rest of the economy. The causes of this rapid increase in

health care costs has many explanations, none of which are comprehensive.

First, quality of care affects the cost of treatment of the patient. The underlying reasons for this are two-fold. One, patients have become much more demanding in the type and amount of care they receive. This demand causes more services to be rendered per patient admission, thus driving costs up. Two, the demand for quality health care has proliferated the notion that more complex and expensive diagnostic systems provide higher quality care. [Ref. 7]

Second, increases in prices charged by hospitals rose significantly over the period following 1965. [Ref. 7] This increase in prices charged can be tied almost directly to the practice of cost shifting in many civilian hospitals proliferated by Medicare reimbursement structures. [Ref. 3]

Finally, the sheer increase in patient demand volume brought about through Medicare and Medicaid caused further increases in health care costs, that coupled with cost-shifting practices, sent health care costs rocketing upward.

D. MEDICARE AND MEDICAID

With the introduction of Medicare and Medicaid the Federal government became a major player in the U.S. health care system. Medicare and Medicaid were arguably responsible for a marked increase in demand for health care services and significant cost increases within the U.S. economy. [Ref. 8]

Medicare was enacted as a Federal program designed to provide uniform eligibility and benefits to all qualified citizens. Medicaid was an outgrowth of earlier programs that were formed to provide health care to economically disadvantaged citizens. Both programs, when enacted, essentially gave a blank check to millions of citizens who previously could not afford access to the health care system. [Ref. 8]

This creation of demand subsequently spurred a large increase in services offered by U.S. hospitals. This increase in services offered by hospitals had the affect of increasing costs to each patient admitted as debt service levels rose. This factor arguably began the rapid increase in health care costs in relation to the rest of the U.S. economy. [Ref. 8] Why were the costs allowed to rise so rapidly? The answer lies in a lack of control in allowable reimbursements.

Medicare, when enacted, had in place no criteria to determine what was appropriate care, nor whether services provided, were effective or efficient. The lack of control on charges paid, hospitals' increases in acquisitions of high-tech equipment, and an increase in volume of services rendered, combined to send the costs of health care in the United States spiraling. [Ref. 8]

In response to these ever increasing costs, the Federal government enacted several initiatives aimed at curbing the cost increases. These initiatives are briefly outlined below.

An amendment to the Social Security Act of 1972 established Professional Standards Review Organizations (PSRO) which were aimed at reducing hospital bed days or Length of Stay (LOS) for a given admission. The LOS was viewed as a major contributor to the cost of hospitalization as most accounting systems lumped costs into a per diem bed day charge which equated to a charge by length of stay in the treatment facility rather than number of services provided. [Ref. 8]

At the same time, another amendment to the Social Security Act promoted the emerging concept of Health Maintenance Organizations (HMOs). These organizations were designed to decrease the cost per allowable admission through capitated reimbursement techniques that motivate the provider of care to minimize patient LOS. [Ref. 8]

These attempts to control Medicare reimbursements had another affect upon treatment facilities. Government

limitations placed on reimbursements associated with treating Medicare patients often resulted in hospitals receiving less revenue for a given admission than it cost to provide the service. This forced many hospitals to shift these losses to other patients covered under commercial insurance programs. This was accomplished through a simple adjustment to the charge per bed day, which essentially re-allocated costs to more profitable areas. This cost shifting added further to health care cost increases as insurance premiums rose in response to rising facility prices. In addition, it can be argued that a portion of the cost shifting practiced by hospitals during this period was more pronounced than required as a full knowledge of the costs associated with a given episode of care were not fully known.

Therefore, new initiatives to control health care costs continued to emerge. The new generation of cost controls attempted to tie cost control to measures of productivity and effectiveness of treatment. In this manner, more accurate assessments could be obtained for each episode of care allowing hospitals to more efficiently allocate resources and more accurately charge for services rendered. Thus, DRGs were born.

E. DRGS: DEFINITION, USE AND SUPPLY COSTS CONTAINED

1. What is a DRG ?

DRGs are statistically significant medical groups that use similar amounts and types of resources and are related in medical nature. [Ref. 7]

DRGs were developed by Fetter, Freeman and Thompson at Yale University in the early 1970's. This group attempted to form groups of similar medical admission categories by means of diagnostic, demographic and therapeutic characteristics. These groupings were created originally by this group using

International Classification of Disease Codes, 8th Revision or ICDA-8 Codes. These were later updated using ICD-9-CM Codes. [Ref. 7]

New Jersey became the first state to adopt DRGs for prospective payment of medical claims in 1978. [Ref. 9] The acceptance of DRGs grew out of the need for validation of claims by hospitals based on clinically relevant productivity measures. [Ref. 8]

This approach by the State of New Jersey was evaluated by the Health Care Financing Administration. Subsequent to these evaluations, Medicare established new reimbursement parameters requiring all claims to be paid under a DRG review format in 1983. [Ref. 9]

DRG codes attempt to capture the intricacies of an admission through classification of the patient into a numeric category based on diagnosis. For example, a patient admitted for gall bladder attacks may be assigned to a specific DRG within a grouping of similar codes, or 190 in a range of 190 to 199. Once a full diagnosis has been made and surgery has been performed, the patient is moved to the next higher DRG indicating more complex treatment. When surgery is completed, a final assignment to a DRG takes place depending on the particular surgical procedure performed. In this manner, the DRG code assigned most closely reflected the type of treatment administered and information concerning the admission would be in a more accurate format for later evaluation in a physician practice pattern program setting. [Ref. 7] It should be noted that when a patient is admitted under multiple DRGs the patient is usually assigned to the DRG category that has the highest amount of historical resource usage.

The adoption of DRG reimbursement structures by Medicare has been argued to have also contributed to cost-shifting by civilian hospitals. In fact, some argue that much of the cost-shifting practices in U.S. hospitals are a direct result

of DRGs. Others argue that the sheer volume of costs shifted under DRGs has decreased as compared to pre-DRG periods, as hospitals have gained a more accurate picture of true costs per episode of care than under previous cost control measures. Further examination of this issue is not required for this study but is an important aspect in understanding the controversies surrounding DRG introduction in the U.S. health care industry.

There are complaints that have been expressed concerning the use of DRG codes. Complaints about DRG classifications center on two issues: loss of statistical viability of captured information and the impact of illness severity.

The loss of statistical purity when patients are classified by DRG is of concern to some physicians. Arguments concerning variances in appropriateness of care and resources used for a given admission are often raised as DRGs do not take severity of illness into account.

Severity of illness drives the amount of resources expended on a patient. These resources may vary considerably depending on a number of factors. These factors may include such items as: stage of disease at admission, rate of recovery, complications from treatment, patient dependence on hospital staff and non-operating room life support. This list is by no means all inclusive but should give the reader an understanding of DRG deficiencies. [Ref. 7]

In response to this, some health care facilities adopted other means of classifying patients including disease staging, patient severity of illness indexes and patient care units. [Ref. 7] Currently, however, there appears to be an industry standard that incorporates severity of illness while allowing the use of DRG classification formats. This review criteria, marketed by InterQual, Inc., utilizes severity of illness in admission criteria. This data is used, along with the DRG classification system, by 4,000 civilian hospitals, DoD and

the Department of Veterans Affairs to conduct utilization management reviews.

Utilization management is the process of reviewing patient's records by trained utilization review personnel to assess the appropriateness of care provided in the treatment facility. This review concentrates on the physician's decisions pertaining to criteria met for tests ordered, admission, surgery and discharge to name a few. This review attempts to identify physicians not meeting the minimum criteria required to execute an episode of care. If the criteria for an episode of care is not met, a series of procedures are followed to inform the physician about the inappropriateness of care rendered thereby reinforcing, through negative or punitive means, adherence to accepted standards within the facility. These criteria are, however, adjusted for severity of illness thereby giving an accurate picture of the episode of care. DoD currently has the ability to relate DRGs to severity of illness per admission through a utilization review process. [Ref. 10]

DRGs are also being re-examined by Fetter and Thompson for the sole reason of incorporating severity of illness measurements into the current DRG system. This new system would double the number of codes in the current Medicare standard DRG system to eleven hundred. This new system, while not simplifying the billing process would allow more accurate and easier utilization review procedures to be conducted without the aid of other assessment criteria. [Ref. 11]

From the above discussion it is apparent that there are numerous complaints regarding inadequacies within the DRG classification system. Be that as it may, DRGs are very widely accepted and growing in use.

2. DRG Use

DRG use has become widespread within the U.S. for three primary reasons: Medicare, comparability between hospitals and physician practice pattern programs. When Medicare mandated payment by DRG for all patients covered in 1983, few hospitals had a choice but to adopt the DRG classification system.

[Ref. 11] Rather than continue to lose revenue for Medicare covered admissions, hospitals adopted the system to be more fully compensated for work performed. This also arguably reduced the amount of cost-shifting being practiced as noted earlier. Under the comparability issue, it became apparent very early on that adoption of the DRG classification system by numerous hospitals provided a means for individual facilities to compare their effectiveness, by category, to other facilities. This ability fostered more cost consciousness by hospitals and began an era of product line planning focused on competition with other facilities.

[Ref. 11]

The final outgrowth of the adoption of inpatient DRGs has been a marked increase in the adoption of physician practice pattern programs. These programs, as mentioned earlier, use feedback of cost data to physicians in order to foster cost consciousness, exert peer pressure between physicians practicing in the same clinical area to control costs, and to allow administrators to map inpatient costs by DRG and physician. This adoption of a DRG inpatient coding system allows physician practice pattern programs to use a common vehicle and allows costs to be compared not only between physicians but to be more accurately presented through severity of illness parameters. Once again, it should be noted that if all costs across all physicians in a clinical area are averaged, this in-house comparison can not take place.

The adoption of DRG based classification has not stopped at the civilian level in the U.S. either. DoD has adopted DRGs for use in its utilization review programs now being implemented in MTFs. [Ref. 12] DoD has also taken the first steps toward allocating resources to MTFs by means of capitation budget techniques based on DRGs [Ref. 13] The adoption of DRGs has not only swept the U.S. but has spread all over the globe. By 1992, DRGs had been adopted in some form in twenty different countries. [Ref. 11]

It is these facts that drive the discussion in this study. DRGs are the universal standard for evaluating episodes of care and are the most sound vehicle through which consumable supply costs capture may be examined and used as an input to physician practice pattern programs.

3. Supply Costs Within DRGs

When examining the dollar magnitude that consumable supplies encompass within total DoD health care expenditures, it appears that physician practice pattern programs can have a large, potential impact upon all of this total. This is not necessarily true.

Consumable supplies, when examined as a percentage of DRG cost, generally follow a Pareto or 80/20 pattern, i.e., approximately 20% of the DRGs in a given facility will generally account for 80% of the total inpatient consumable cost. In fact, selected DRGs may contain consumable supply costs as high as 70% of total cost. [Ref. 2] Therefore, it would seem prudent to include these DRGs first in a cost capture system that would feed the physician practice pattern program system developed. The top 20% of DRGs in terms of volume of service should be included next in a capture system. These DRGs may or may not represent the DRGs with the highest percentage of consumable cost in relation to total cost but represent a large dollar amount in terms of consumable expenditures, given their volume. This captured data should

also be fed into the physician practice pattern program system.

By including these high cost DRGs in the facility physician practice pattern program, between twenty and forty percent of the DRGs in a facility or as much as 80% of the total consumable cost present in the facility may be affected through a physician practice pattern program. Thus, it becomes evident that consumable cost reductions by means of physician practice pattern programs may be an effective means to control a significant portion of the total operating cost of a treatment facility.

F. PHYSICIAN PRACTICE PATTERN PROGRAMS

Physician practice pattern programs can be an effective means of controlling supply costs within a facility. As mentioned earlier, physician practice pattern programs utilize cost data feedback presented to the physician in order to reduce variation in practice patterns which can lead to lower costs per DRG.

A physician directs, through his or her decisions, 70% of the total dollar expenditure within a treatment facility. [Ref. 2] If variance in practice patterns can be reduced, significant savings can be realized.

One of the most visible and easily controlled portions of treatment costs is consumable supplies. Labor costs, although accounting for as much as 70% of the total dollar expenditure within a treatment facility, are not directly affected by the physician. Nor are capital equipment purchase decisions affected by physician pattern variance reduction. Therefore, one of the most readily affected areas of cost reduction within the facility through physician practice pattern programs is consumable costs. [Ref. 2]

Now that we have examined how supply costs have been historically captured, why and how DRGs came to be adopted and

examined the magnitude of potential cost savings to the Military Healthcare Support System (MHSS), the study will move to a detailed discussion of the applicability of capturing physician specific cost data and using this data as an input to physician practice pattern programs first in the civilian sector, then move to analysis of potential savings within the MHSS.

III. CIVILIAN HOSPITAL PHYSICIAN PRACTICE PATTERN PROGRAMS

A. INTRODUCTION

Now that the study has examined what role DRGs can play in capturing consumable supply costs for use in physician practice pattern programs, the study shifts to an examination of what drives physician behavior and physicians' lack of knowledge and concern about the costs of care. The study then shifts to an examination of the relationship between variance in physician practice patterns and cost. The study then shifts to an examination of physician practice pattern programs, both negative and positive, and identifies the features of an effective physician practice pattern program. The study then examines the benefits that may be accrued in other management areas within a treatment facility by using data provided from a physician practice pattern program. Finally, the study summarizes the importance of true cost data in an effective physician practice pattern program.

B. PHYSICIAN BEHAVIOR AND KNOWLEDGE OF COST

1. Physician Behavior

The treatment prescribed for a given scenario may vary greatly between physicians, dependent upon a number of factors. Medical training is one area that has an impact on the way physicians prescribe treatment.

Medical training puts a great amount of emphasis on diagnostic workups and the use of technology. The use of technology by physicians to confirm diagnoses is prevalent because of the ramifications of mis-diagnosis of the patient. Therefore, many diagnostic tests are ordered to assist the physician in making objective judgments. These extra tests, in many cases, add only an incremental increase in objective criteria and greatly drive up the cost of an episode of care. [Ref. 14] The practice of ordering multiple tests is decreasing, however, as more and more third party payers begin

to reimburse based on appropriateness assessments as provided by utilization management and other review techniques.

The type, location and time of graduation from medical training also affects the type of treatment provided. Physicians graduating from different training programs may, in fact, prescribe different treatment regimes for identical patient case scenarios. [Ref. 15]

Other factors influencing the type of treatment prescribed for a given patient case scenario include the area of physician specialization, setting or place of practice, historical observations of similar scenarios by the physician, and published medical studies revising treatment protocols. [Ref. 15]

All the above factors contribute to variation in practice between physicians. Some causes of this variation have already been presented. A final factor contributing to the variation in physician practice patterns is physicians' lack of knowledge and concern about the costs of treatment.

2. Lack of Knowledge and Concern about Costs

Physicians are not knowledgeable concerning the costs of the treatments they prescribe. [Ref. 14] In addition, many physicians are ignorant of the costs involved in ancillary tests they order. [Ref. 15] Physicians are not knowledgeable or concerned about the costs of the treatments they prescribe due to medical training, medical ethics, a lack of information, the prevalence of third party payment systems, and patients' demand for quality care.

Medical training, as explained above, greatly influences the way in which a physician will react to a given scenario or set of diagnostic criteria. Medical training programs historically have not emphasized the costs of various treatment options within the curricula taught. Lack of cost-consciousness by physicians is therefore, in part, a result of training.

Medical ethics is another reason for physicians' lack of knowledge of the costs of treatment. Physicians often view the consideration of cost when prescribing treatment as an intrusion into the physician-patient relationship. This intrusion seems to cause conflict as the physician's decision should be based upon what is best for the patient and not what it costs to heal the patient. Therefore, decisions are often based more on personal preference of the physician than those that would be derived from a quantitative measurement or cost-benefit analysis. [Ref. 16]

The other side of this argument, however, is whether a more expensive test should be ordered when it provides little or no more benefit than a less expensive test. Is this ethical? Utilization management and other techniques are beginning to answer this question.

Another reason that physicians lack knowledge of the cost of treatment is that they are simply not provided this information. Physicians function, much of the time, within a cost information vacuum. The above discussion of medical training and medical ethics play key roles in this. Physicians behavior is greatly influenced by their colleagues. [Ref. 14] The underlying factors of medical training and ethics therefore serve as a buffer to filter out feedback to the individual physician. Insulated within a large group of physicians, who have been trained in a similar manner as the individual, physicians seem to have a difficult time obtaining the cost information needed to become more cost conscious.

Another reason behind physicians' lack of concern about costs of treatment is the prevalence of third party payment systems. As mentioned previously, utilization management programs have begun to curtail this practice. However, a physician who does not have reinforcement, negative or positive, applied might be tempted to over order tests, medications or other treatments. This is particularly so for

a physician in private practice who's income is tied directly to the amount of services he/she provides or orders.

A final reason for the lack of concern about costs by physicians is the threat of liability. Patients demand that they receive the best possible treatment available. Physicians feel compelled to provide this level of care not only because of patient's demands but because of liability factors. The threat of a lawsuit for not providing the best possible care is ever present. Therefore, many times physicians practice high cost, defensive medicine.

These factors have contributed to an increase in the use of physician practice pattern programs. There is evidence that, by breaking through these paradigms, providing positive feedback to physicians in a non-threatening manner, and involving senior clinical leaders in the physician practice pattern program, significant reductions in variance between individual physician's practice patterns can be achieved. [Ref. 14]

C. PRACTICE PATTERN VARIATION AND COST

Evidence of variation in physician practice patterns is well documented:

In Vermont, the chance of having one's tonsils removed as a child range from 8 percent in one community to 70 percent in another. In Iowa, the chance a man will undergo prostate surgery by age 85 varies from 15 percent to more than 60 percent. A comparison of utilization rates across four states found more than threefold differences in rates of heart bypass, thyroid, and prostate surgeries; fivefold differences for back and abdominal surgeries; sevenfold differences for knee replacements; and almost 20-fold differences for carotid endarterectomies. [Ref. 16]

From the above, it would seem obvious that the treatment of one population when compared to another population varies in the extreme. There is, however, no data to indicate that one

population is healthier than another population. [Ref. 16] Thus, the selection of treatment protocol, which directly affects the cost of the patient's health care, does not appear to affect the overall health of the population. Once again, medical training and other factors play roles in this phenomena.

High or low health care costs in a community are directly correlated to variation in physician practice patterns. Since as much as 70% of the total health care dollar expenditure is directly affected by physicians, it is necessary to modify physician practice patterns in order to reduce costs. This modification of practice patterns attempts to minimize variance in physicians use of resources so that the costs associated with caring for a population are more closely correlated with the health of the population. This control of costs through reduction in physician decision variances is being widely attempted through physician practice pattern programs.

D. PHYSICIAN PRACTICE PATTERN PROGRAMS

As observed above, there are many factors that affect the variance in physician practice patterns. Physician practice pattern programs are designed to modify physician behavior and reduce practice variance through modification of the controllable factors. These controllable factors are the lack of knowledge and concern about the costs of medical procedures. By presenting the costs of clinical decisions to physicians these programs increase the awareness and concern of physicians about the costs of the treatments they prescribe.

Physician practice pattern programs generally fall into two categories: negative feedback and positive feedback. Both are examined below.

1. Negative Feedback Programs

a. Utilization Management

Utilization management began in the late 1960's in response to rising health care costs and the establishment of Medicare. Utilization management has, since its inception, grown rapidly in acceptance. Today, 74% of the largest five thousand employers in the United States use utilization management in some format for the purpose of validating health insurance claims, much as the Federal Government does through the Medicare program. [Ref. 17]

Utilization management, specifically, is a set of techniques used by health purchasers to assure efficient decision making by physicians. [Ref. 17] This process uses criteria to determine whether care decisions made by the provider are appropriate. Thus, this process is directly involved in assessing physician decisions regarding patient care.

This involvement in the decision process can involve pre-admission, concurrent or retrospective reviews. [Ref. 17] In order to understand how these different areas of review can affect physician decision making, it is necessary to examine how the process works.

A functioning utilization management program generally involves the establishment of a utilization management department within the treatment facility. This area is staffed with utilization management trained personnel who review patient treatment records to ascertain whether the treatment received was appropriate. This review is not limited to only an assessment of treatment appropriateness but of the appropriateness of admission and discharge. How do these personnel determine appropriateness?

All of these areas have certain criteria that must be met to qualify the admission, treatment or discharge as a valid decision by the physician. For example, for a patient

to be admitted for a given surgical procedure, criteria such as a certain set of vital signs, ancillary diagnostic test results or other indications must be met. If these criteria are not met, the utilization management department will not qualify the admission. This is not to say that the utilization management department can dictate treatment. The attending physician can override the disqualification decision made by the utilization management department and choose to admit the patient. If this happens, however, the record is flagged and referred to a physician advisor.

The physician advisor is a member of the utilization management committee and has responsibility for adherence to accepted criteria by the facility's physicians. The physician advisor reviews the decisions made by the attending physician in an attempt to qualify the admission. If no qualification is identified, the physician advisor then approaches the attending physician and explains the facilities policies concerning adherence to utilization management committee issued criteria. In this manner, negative feedback, or harassment, is provided to the attending physician in order to modify his/her behavior with regards to practice patterns. [Ref. 12] It should be noted that the criteria used to qualify admission, treatments and discharges are weighted through severity of illness measures. This allows a very accurate assessment regarding review and qualification of the attending physicians decisions.

Review of the patient's record by utilization management personnel may begin at pre-admission and continue through concurrently and retrospectively. Pre-admission review is review of the admission orders to determine if an admission is qualified by established criteria. This type of review provides an opportunity for intervention by the utilization management department and the physician advisor before admission decisions are made.

Concurrent review is a review in which utilization management personnel monitor patients records while in the facility. This type of review provides another opportunity for diagnostic decision review and intervention by the physician advisor as the decisions are reviewed in real-time.

Retrospective review involves review of the patient record after discharge of the patient. If records are reviewed retrospectively, instead of concurrently however, decisions made by physicians can not be brought to the physician advisor in a time frame that would allow modification of the attending physician's decision. Therefore, physician decisions reviewed retrospectively would seem to be a poor tool for prompt intervention and modification of decisions, but may be a good tool for later analysis or as an input to more positive feedback programs.

b. Critical Paths

Another area of negative feedback enforcement is the outgrowth of critical paths. Critical paths are designed around, and are similar to, the utilization management process. Critical paths are paths that should be followed by the physician when a certain set of diagnostic criteria are present. These pathways are formulated in part through the use of utilization management criteria with the added feature of input gathered from a consensus of the facility's physicians. [Ref. 18] An example clarifying this process follows.

The critical path for a given surgery may include pre-admission lab tests, vital signs and other diagnostic test results. If these path criteria are met, the patient is admitted and flows to another step in the path. This is similar to the utilization management process. The critical path method is different from the utilization management process, however, in that each step in the process presents an opportunity for the nursing staff to directly document

variance at the point of delivery. If tests ordered are within the path, a simple check mark is placed in the appropriate space on the path chart. However, should the test ordered be outside the pathway, it is recorded on a variance sheet. Thus, this process presents two unique opportunities. First, the critical path method reduces time the nursing staff dedicates to chart documentation. Second, variances from established critical path criteria are clearly evident and available without further consultation of other utilization management criteria data sources. It should be noted that variance from the established critical path criteria is still fed back to the attending physician in a similar, negative manner. In fact, negative feedback from the critical path method may be viewed as even more negative than that provided from the utilization management process as the physician is varying outside of his/her colleagues views.

The important thing to note is that providing negative feedback to the physicians for variance outside accepted criteria should produce less variance in physician practice patterns and therefore lower costs for a given episode of care. This negative feedback or harassment may go only so far, however, in attempting to reduce variation in physicians' practice. If physicians persist in violating established utilization management or critical path criteria, even more negative consequences or incentives can be applied.

Physicians are increasingly becoming part of either physician groups or treatment facilities that contract health services on the basis of capitated rates. Therefore, it is in the physician group's or treatment facility's best interest to minimize the cost of treatments prescribed while attempting to retain quality of care for liability reasons. Physicians within these types of organizations are generally let go or fired if frequent and repetitive violations of utilization management or critical path criteria are identified. Thus,

incentives under a negative feedback program are clear: accept the criteria or work elsewhere.

The cost of reducing variation through the use of a fully functional utilization management program is often debated however. Sources indicate that the cost of a running utilization management program are, in most cases, only 1% less than the savings produced. [Ref. 19]

The above methods may also be used to perform retrospective review for the purpose of providing positive feedback, however. If the data collected through the utilization management or critical path process are coded by DRG at discharge, valuable feedback information may be obtained.

Coding by DRG, and utilizing severity of illness adjustments, allows utilization management data to be analyzed and used within a positive feedback process. Data presented in a positive format seems to be very useful to the physician and, in fact, reduces variation more cost effectively than a negative feedback program. [Ref. 19] The utilization management process can provide some of the specific data needed to perform a successful positive feedback program. This is true of both variants of the utilization management process.

The data collected through these methods is, however, mostly clinical in nature. The above methods capture clinical data that may or may not include a clear picture of costs, let alone supply costs. An example of this might be a notation in the patient chart that a certain lab test was ordered. This information only includes a notation that the clinical procedure was performed. This notation does not, in most instances, include the cost of the procedure. Thus, it becomes necessary to link the clinical data captured through the utilization management process to the cost data available in the facility's accounting records in order to provide

accurate clinical and cost data to a positive feedback program. Facilities often use average cost data to meet this need because of the step-down cost accounting methods used. This is particularly troublesome when attempting to analyze physician practice patterns through positive feedback programs.

Some hospitals, however, have begun to link utilization management and critical path data with actual cost data rather than average cost data. [Ref. 20] This is possible through the use of better cost accounting systems that capture the cost of patient care. These systems include, but are not limited to, bar coding and bedside computing. [Ref. 21] These systems allow accurate cost information to be combined with utilization management data to provide the input needed for a positive feedback program. Data collected in this format includes clinical and cost data sorted by physician, patient and DRG.

Other facilities, however, have begun implementing complete stand alone cost capture systems that are not tied to the utilization management process. These systems also use DRGs as the capture vehicle but often lack the ability to adjust cost data by severity of illness as provided through a cost accounting and utilization management linked system. [Ref. 1]

Thus, it is in a civilian hospital's interest to implement and run a utilization management program. A functional utilization management program can reduce variance in physician practice and control costs. However, as mentioned above, savings are projected at only one to two percent over and above the cost of running a utilization management program. How does a facility then realize extra cost savings through a utilization management program.

Significant cost savings to the facility can be realized by linking the current utilization management program

with an accurate cost accounting system. This linked system can then feed a positive feedback method that may accrue additional savings and benefits.

2. Positive Feedback Programs

Positive feedback programs range from "Economic Grand Rounds" to "Physician Profiling" to "Benchmarking" to simply "Physician Feedback". These programs vary in design and complexity but all have one common result: they reduce costs very effectively.

a. Simple Models

Costs associated with patient care are reduced by these programs through simple means. The most easily implemented is the presentation to the physicians of cost data associated with particular clinical decisions. This type of format is used in Economic Grand Rounds and Physician Feedback programs. [Ref. 22] The presentation of general cost data to physicians can have significant benefits.

Providing data to physicians concerning the number and cost of laboratory tests ordered has been shown to reduce the costs associated with this area by seventeen to twenty nine percent. [Ref. 15] These types of savings can also be accrued in other general ancillary areas such as pharmacy and radiology. It is important to note that data presented under this type of format is not usually coded by DRG or other clinical vehicle but is presented as general information. Thus, this type of program is not dependent upon data fed from a link between the utilization management process and an accurate cost accounting system. This lack of a clinical vehicle which tracks costs makes it difficult to tie incentives to this type of program. There are specific ways to tie incentives to performance under more complex positive feedback programs, however.

b. Complex Models

More complex positive feedback programs involve not the presentation of cost data feedback to the physicians in a general format, but data sorted by physician. This is true of Benchmarking and Practitioner Profiling. Data are coded by DRG with severity of illness indicators included to allow a narrow view rather than an overview of cost data as presented in the simple positive feedback programs mentioned. Data in this format can be presented in a blind format to groups of physicians from the same clinical area of practice. [Ref. 2]

Physicians attending a Practitioner Profiling meeting are assigned a number. The physician is the only person who knows his or her number. Data on costs per DRG, by numbered physician, is then presented to the group in a manner indicating variances in specific cost categories above and below the group average. In this manner, the physician can review how efficient he/she is as compared to all other physicians by DRG. This type of feedback program relies upon the competitiveness of the individual physician to modify his or her behavior. Feedback, in this form, has proven to be very effective. In fact, one hospital reports a cost reduction of 30% in high supply cost DRGs. [Ref. 2] These DRGs are the top 20% of DRGs in the facility and contain 80% of the total supplies cost for the facility.

As mentioned previously in the study, approximately 20% of the DRGs performed in a facility contain 80% of the total supply costs for the facility. Combined with the facts that: 70% of the total dollars expended in the facility are controlled by the physician, supply costs are the most easily affected portion of costs and a potential to save 30% of the supply costs in these selected DRGs, it is clear that there is great potential within this type of program to reduce costs.

Stronger reinforcement can be applied to a positive feedback program, however, if positive dollar incentives are

tied directly to physician performance in the form of increased income. As mentioned previously, as more physicians become part of a capitated health care system, the requirement to become efficient increases. In addition to applying punitive incentive measures such as those employed under a negative feedback model, positive incentives can be added. These incentives may be in the form of bonuses or profit sharing and may be presented in a blind format if desired. The inclusion of positive incentives can add emphasis to controlling physicians' variance as efficient behavior is rewarded and reinforced. Rewarding efficient behavior through economic means adds emphasis for physicians to retain post-intervention behaviors as explained below, but is not required to promote cost efficient physician behavior. Peer pressure and individual competitiveness are often all that is needed to make a complex positive feedback method effective. [Ref. 2]

The costs to run this type of program are not easily identified, however. The costs of collecting clinical data to run this type of program can be assumed to be minimal as the clinical information needed is provided by the utilization management process already in place within the facility. The cost of providing accurate cost data is a more difficult variable to estimate. The cost of an accurate cost accounting system is undefined. Therefore the cost of an accurate accounting system is assumed to be minimal within this study.

3. Features of an Effective Physician Practice Pattern Program

Effective positive feedback physician practice pattern programs have two common themes: continuous participation by physicians and presentation of feedback in a non-threatening manner.

Evidence suggests that if physicians do not participate in a positive feedback physician practice pattern program regularly, their pre-program intervention practices will re-

emerge within three months. [Ref. 23] Other literature suggests that a return to pre-intervention practices will happen even more quickly. [Ref. 24] This is particularly true of simple positive feedback methods that do not track individual physician performance. Thus, it becomes critical that continuous and frequent involvement by physicians in a physician practice pattern program is a must if significant costs are to be reduced on a permanent basis. When continuous involvement is combined with peer pressure this trend is reinforced. [Ref. 2] As mentioned previously, this applies only to the more complex positive methods.

Evidence also suggests that an effective physician practice pattern program must incorporate not only a positive atmosphere but an educational atmosphere when presenting data to physicians. [Ref. 22] Other evidence suggests that the data be presented to physicians in an information sharing environment in order to encourage discussion. [Ref. 14] This type of environment is contrary to the negative feedback environment produced with a utilization management program but is right in line with reducing variation in physician practice patterns through positive feedback programs.

It is apparent that variation in physician practice patterns may be reduced through a number of different methods. Both negative and positive feedback methods tend to reduce variation in physician practice. Positive methods, however, appear to produce the greatest cost savings of the two general methods. This is especially true of the more complex positive methods that present data by DRG. These methods function most effectively when an educational and information-sharing atmosphere are incorporated as part of the system. These methods also require a sophisticated cost accounting or cost capturing system in order to function in the manner designed.

The complex positive methods that use data sorted by DRG also provide further opportunities for other management areas

within the treatment facility. This is also true of more advanced utilization management programs that, when linked to cost capture systems, can provide valuable data. By sorting cost and clinical data into usable groupings, data may be used in a number of different and beneficial ways. A discussion of these benefits follows.

E. BENEFITS TO OTHER MANAGEMENT AREAS

The reduction in variance associated with physician practice patterns has potential benefits to two other management areas. These areas are product line decisions and materials management.

1. Product Line Decisions

Treatment facilities must have the ability to rapidly respond to brief business opportunities and a fickle fiscal environment. In order to do this, treatment facilities must have detailed information. This information can be provided by the facility's physician practice pattern program.

Treatment facilities in the civilian market often make decisions as they pertain to what products or services to offer, reduce, expand or open. These decisions can be readily assisted using accurate physician cost data as provided from a comprehensive physician practice pattern program. [Ref. 25] An example of the value this data brings to product line decision making follows.

In order to evaluate whether to expand a service offered by the facility, knowledge of reimbursement rates for that particular service or DRG has to be ascertained first. Next, the facility must determine whether costs of performing the DRG are less than reimbursement rates. This decision may, and often is, made based on average costs. This may result in a prudent business decision. There are, however, instances where a decision based on average cost, as produced by step down or assumed cost accounting methods, may not be wise.

If the treatment facility knows that the reimbursement rate for a cardiac catheterization procedure is, for example, \$20,000 then it would appear that the prudent business decision would be to not expand this service if the average cost of performing this DRG were \$22,000. However, if accurate cost data were captured in an effective physician practice pattern program, it might reveal that four of five physicians performing this procedure have individual costs of \$18,000 per procedure and a fifth has a cost of \$38,000. If this were the case, a decision not to expand this service would not be the correct one. A better decision would be to expand the service while attempting to reduce the fifth physician's variance through incentive techniques. [Ref. 2] This type of analysis is only possible, however, if the true cost of a DRG is captured by physician and not averaged through cost centers or assumed through a general study of the procedure.

The above example also illustrates another point. Cardiac catheterization is a procedure that contains a high percentage of supply costs. Catheterization sets required to perform the procedure cost hundreds of dollars each. The volume of sets used in a procedure may vary dependent upon the physician performing the procedure. This variation in volume of sets used may be the result of training, poor sterile technique or other factors. [Ref. 2] Thus, variation in physician practices may produce thousands of dollars difference between separate procedures. [Ref. 2] Therefore, accurate cost capture, especially that of supplies, becomes critical if variance is to be reduced through an effective physician practice pattern program.

Another example that clarifies the value of using both clinical and supply cost data within a DRG is that of DRGs that contain a high percentage of total DRG cost in one supply item. This is true of joint replacement surgeries. [Ref. 26]

Joint replacement surgeries such as hips and knees can contain over 30% of the total cost of the DRG in one supply item. A typical knee replacement surgery having a total cost of \$11,000 contains a cost of \$4,000 for only the prosthesis. [Ref. 26] The impact of the cost of this one item is central to the cost of the DRG as minor discounts from vendors have a major impact on total DRG cost.

Having the ability to analyze both cost and clinical data within one of these DRGs has significant advantages, as demonstrated above. However, analysis of similar DRGs can reveal significant differences in the total cost of the DRG dependent upon the supply item used. A cheaper item may produce complications more often than another, more expensive item thereby increasing the length of stay for the average patient. This increase in length of stay of the patient may elevate costs per total DRG over the difference in the supply items' costs. Once again, the analysis performed here is possible only if the cost capture system is linked with the utilization management process that provides clinical information.

Thus, it becomes a tangible advantage to have the ability to analyze not only supply costs per physician and DRG but the ability to analyze how the supplies affect the expected medical outcome and the total cost of the DRG. This analysis provides a prime opportunity for examination by management of costly procedures performed by certain physicians. It also provides the ability to make decisions regarding major product lines carried in the facility so that total costs of an episode of care are minimized. [Ref. 17]

A final benefit provided to product line decisions is the ability to evaluate competitors' product lines and assess the facility's physicians' practices versus its competitors' physicians. Civilian hospitals can now subscribe to regional information services that analyze numerous hospitals' cost

accounting data. These data, when later presented back to the subscribing hospital, show where the individual hospital is in relation to it's competitors in terms of DRG cost. This information is extremely valuable to management. [Ref. 19]

As shown earlier, physicians receive much of their information and feedback from their peers. If a physician's peers are all using a high cost, non-generic medication for a certain DRG, modification of that individual physician's practice is unlikely to take place as he or she would then be varying outside peer norms. Another hospital's physicians, as a group, might be using the generic medication for the treatment of the same DRG. If information about the competitor's practice patterns could be relayed to the facility's physicians, a shift in the entire group to the less costly generic medication could possibly take place. Viewed in a different manner, there is no variance present in the first facility's physicians as they all use the same medication. There is a large variance present, however, between the first hospital's physicians and the other hospital's physicians. Having the ability to examine not only variance in one's own facility but variance between facilities is valuable. It should be noted that subscription to this type of service is made much easier if participating hospitals have the ability to capture patient-level cost data by DRG.

Thus, accurate cost and clinical data, used in physician practice pattern programs, have another beneficial area of use. Accurate cost and clinical information, when broken down by physician and DRG, gives the facility the ability to direct resources to profitable service areas and reduce or eliminate areas of inefficiency. [Ref. 25]

2. Materials Management

Variance reduction can also have direct financial benefits for materials management within a treatment facility. By reducing the variation in the types and amount of supplies

required to perform a certain procedure or associated with a particular DRG, materials managers can move towards standardization of supplies or pre-packaged treatment sets. [Ref. 27] The ability to move toward standardization of supplies has definite financial benefits.

Standardizing supplies carried by a materials management department reduces costs for various reasons. The amount of different items carried in inventory can be reduced thereby eliminating carrying costs for that inventory. [Ref. 27] Carrying costs are the costs associated with storage of the material such as deterioration, theft, obsolescence, and interest on the dollar investment in the inventory. These costs can run as high as 23% of the value of the product per year. [Ref. 28]

Another area of cost savings associated with supplies standardization is that of reducing the number of vendors purchased from. This reduction in the number of vendors can lead to two potential cost savings: reduced order costs and volume discounts. [Ref. 27]

Each purchase made by the materials management department costs money in terms of the administrative costs of preparing the documentation, tracking purchase orders and receiving. The reduction in the number of vendors dealt with provides the materials management department the ability to consolidate small orders purchased from multiple vendors to a few, large purchases made from a small number of vendors, thus decreasing the total order costs for the facility. [Ref. 1]

Another benefit of reducing the number of vendors is that of volume discounts. [Ref. 27] Many vendors offer their products in terms that associate dollar savings off the purchase price if larger volumes are purchased at a time. Reduction in the number of vendors purchased from and standardization of supplies allows this cost savings to bloom also.

Another benefit of variance reduction and the standardization of supplies is the ability of materials managers to purchase pre-packaged DRG sets. These pre-packaged DRG sets contain all the supply requirements associated with a particular DRG. Some civilian hospitals are beginning to purchase supplies in this manner specifically for areas with high volume usage such as operating room procedures. Purchasing pre-packaged DRG sets allows materials managers the ability to reduce the number of items carried in inventory by receiving, tracking, and issuing one item versus multiple items per DRG. The ability to purchase pre-packaged sets also has the potential to offer financial benefits as vendors are now marketing DRG sets at lower cost than the individual items within the sets would have originally cost.

[Ref. 27]

Finally, variance reduction and the ability to standardize supplies opens the door to opportunities involving stockless inventory. The hospital of the future may have the ability to order, in real time, per-packaged DRG sets based on the admitting department's daily output reports. It is important to note, however, that purchasing these pre-packaged sets is dependent upon achieving low variability in usage patterns. Large variation in usage will negate the ability to use this option. Thus, it is even more critical that physician practice pattern programs continue to reinforce accepted patterns of practice to allow continued use of this purchase option. [Ref. 27]

F. SUMMARY

This study has examined physician practice pattern programs, how they control practice pattern variance and, consequently, costs. Physician practice pattern programs can function effectively, however, only if two things are present: a link between an accurate cost accounting system and

clinically relevant information, and continuous involvement of the facility's physicians in the program.

Cost data required to run an effective physician practice pattern program, and to accrue the benefits associated with it, should be captured in a manner that is specific to each physician, patient and DRG. If costs are averaged or assumed, specific cost data concerning practice pattern variance is lost. It would be futile to use average or assumed cost data to control specific cost drivers.

Negative incentives can be important in running an effective physician practice pattern program. Positive incentives can also be used. However, peer pressure and continuous involvement by the facility's physicians are the most effective motivators in modifying physician practice patterns.

Now that the study has examined the benefits associated with capturing supply cost data for an effective physician practice pattern program in the civilian environment, the study shifts to an examination of physician practice pattern programs in the military environment.

IV. MILITARY TREATMENT FACILITIES

A. INTRODUCTION

The study has examined the benefits that can accrue to civilian treatment facilities from running an effective physician practice pattern program. The study now shifts to an examination of the benefits that could be accrued to MTFs from an effective physician practice pattern program.

As a prelude to the analysis of the applicability and usefulness of physician practice pattern programs to military health care it is required that we examine the level of financial magnitude that encompasses DoD health care costs and, more specifically, the costs of consumable supplies applicable to the DoD health care system.

DoD health care spent \$18.7 billion in 1993. [Ref. 29] This expenditure covered the medical treatment of 8.7 million beneficiaries of which 1.9 million were active duty. [Ref. 30] Of the \$18.7 billion spent by DoD for health care, \$5.4 billion was for Military Personnel pay and allowances, \$3.6 billion was for the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) and \$.293 billion was for capital equipment purchases. This left \$9.2 billion for Operations and Maintenance funds for the direct delivery of health care in MTFs. [Ref. 30] Consumable supply costs lie in this last category but are difficult to ascertain with current accounting techniques.

If we assume that DoD health care expenditures, presented by cost category, are similar to those in civilian health care, an estimate of consumable supplies costs within DoD may be made. As a national average, consumable supplies, including pharmaceuticals, accounted for 12.84% of the total health care expenditure in 1993. [Ref. 6] Navy medical headquarters staff indicate this number may be low as it relates to DoD medicine. DoD consumable supplies and pharmacy

costs are estimated at 15% of total health care costs. [Ref. 31] Therefore, a figure of 14% which splits the middle is used. Therefore, it is projected that consumable supplies costs within the MHSS for 1993 amounted to \$2.6 billion, or 14% of \$18.7 billion. Presented in a different frame, this expenditure amounts to 28% of all Operations and Maintenance health care funds expended in 1993. In order to ascertain the consumable supply cost for inpatient care, however, a final calculation is required. The total MHSS supply cost for 1993 must have outpatient costs eliminated. In this manner, only the potential cost savings associated with DRG (inpatient) supply cost capture methods and their contribution to physician practice pattern programs may be analyzed. However, identification of this number requires another assumption be made.

Currently, there exists no good estimate of the inpatient share of consumable supply cost within the MHSS. Navy medical headquarters staff indicate that an answer to this question is currently being attempted by the Office of the Secretary of Defense for Health Affairs but no determination as to what would constitute a good guess is able to be obtained. Therefore, for lack of a better estimate, a figure of 50% is assumed pertaining to the inpatient share of total consumable supplies expenditures per year. This equates to a total inpatient consumable supply cost for 1993 of \$1.3 billion. Therefore, the analysis of DRG based, inpatient consumable supply cost capture systems and the potential benefit that physician practice pattern programs could provide will use this dollar amount.

This study specifically examines the state of development of both negative and positive feedback programs, the availability of cost accounting data, and the applicability of incentive systems. The study then examines the potential cost reductions from a fully functional

physician practice pattern program and potential savings in other management areas.

B. NEGATIVE FEEDBACK PROGRAMS

1. State of Development

Both utilization management and critical paths are currently being integrated into management structures by many MTFs. [Ref. 12] This is a result of mandates from higher authority. [Ref. 32] Both of these programs produce severity of illness adjusted data. Therefore, the clinical information is available to reduce costs through a reduction in physician practice variance by means of a negative feedback method.

2. Availability of Cost Accounting Data

Cost accounting systems, on the other hand, are not sufficiently developed to fully accommodate a functional physician practice pattern program.

There is one fully operational cost accounting method in operation today in MTFs. This cost accounting method, MEPRS, is a step-down accounting algorithm that produces average costs. As the study examined previously, average costs produced by this type of system are not sufficient to support an effective physician practice pattern program. [Ref. 4]

There is, however, a new system being produced by DoD that will supposedly enhance the cost capture capability of current systems. This new system will enable captured costs to be coded by DRG. This system is called RCMAS-OSE which stands for Retrospective Case Mix Analysis System-Open System Environment. [Ref. 13] This system will fill the void of having costs presented by DRG. There is, however, a significant limitation with this system. It produces average DRG costs. [Ref. 13] Once again, the averaging of costs by an accounting system negates the opportunity for MTFs to examine costs specific to particular high costs DRGs as related to individual physicians.

DoD is currently attempting to implement another cost accounting system through a linkage of current patient charge systems to a costing system. This system uses clinical procedure entries within the patient record to assign an assumed average cost, arrived at through studies, to the procedure for the purpose of costing DRGs and as an input to physician practice pattern programs. There are significant limitations with this approach.

First, costs identified through studies of a particular procedure vary. In order to arrive at a standard cost, however, variance is disregarded and an average cost is used to simplify the process. Second, clinical procedure entries do not contain specific supply use data. For example, a simple blood test will be annotated as completed. It does not contain information that may indicate how many needles, syringes or other items were used to perform the procedure. Variance in resource usage patterns may differ dependent upon the technician performing the procedure. Therefore, assuming an average cost for all procedures loses the variance data needed to track practice patterns. It is the capturing of this physician-specific data that contains a clear picture of variances in individual physician's practice patterns that is crucial to a physician practice pattern program. This example can be expanded to the operating room where large, and very costly variances are present while simple clinical entries are recorded. Thus, this new attempt to identify costs for the purpose of inputting to physician practice pattern programs adds little value to present systems. [Ref. 5]

Thus, it seems that DoD's attempts to integrate an accurate cost collection system for the purpose of linking to a clinical data system for use in physician practice pattern programs continues to struggle. This need is recognized within DoD. [Ref. 32]

Numerous DoD documents identify the lack of an accurate cost accounting system as a large hindrance to any attempt to run an effective physician practice pattern program. [Ref. 33] In addition, the use of average costs within MTFs for the purpose of evaluating physician variance is recognized as being futile. [Ref. 32] The systems examined above do not alleviate the problem of a lack of physician-specific cost accounting data.

3. Availability of Negative Incentive Systems

Negative incentives for the purpose of reinforcing compliance with accepted clinical performance criteria are available within DoD in abundance. Negative incentives can run the gamut of bad fitness reports to dismissal for physicians who choose not to comply with accepted criteria.

There is, however, no documented or accepted formula within DoD that dictates what degree of negative reinforcement should be applied for specific non-compliance. Calculation of a negative reinforcement schedule, therefore, seems to fall on the shoulders of the administration of each MTF. This delegation, and lack of direction, seems to muddy the waters as individual MTFs could vary greatly in the negative incentives used for variance violations. This variation could potentially lead to abuse of negative incentives if cost savings are emphasized too heavily. This could potentially lead to a reduction in the quality of care delivered as cost efficiency may be rewarded at the expense of effectiveness of care delivered.

4. Potential Savings from a Negative Feedback Program

As documented earlier in the study, utilization management programs rarely exceed a cost savings in excess of 1% over the cost of running the program. This is assumed to be true of the critical path method also. Two reasons exist, however, to explain why MTFs would choose to incorporate a functional utilization management program.

First, utilization management is mandated to be run in MTFs and second, utilization management produces potential savings in the form of better product line decisions and cost savings to materials management. Savings in other management areas are possible only if the clinical DRG data produced by the utilization management program are linked to an accurate cost accounting system. Thus, accurate product line decisions can be made if clinical and cost data can be connected.

5. Savings in other Management Areas from a Negative Feedback Program

DoD is currently restructuring resource allocation procedures so that authority for the expenditure of all funds, both in-house or direct and non-direct or CHAMPUS, is in the hands of the individual MTF commander. [Ref. 13] This resource allocation is based upon a capitated rate for all beneficiaries in the MTF's catchment area. This is similar to civilian hospitals contracting with large corporations based upon a capitated rate. Therefore, MTF commanders will have the responsibility to direct resources to the most cost efficient product line, either direct care or non-direct care. The MTF commander will also have the responsibility of staying within the capitated rate structure. This will be made much easier if data from an effective physician practice pattern program is used.

As previously discussed, if only average cost data is used for these product line decisions, sub-optimal decisions may be produced. Accurate product line decisions can be made more accurately using physician-specific data as provided by a physician practice pattern program.

Materials management could also benefit from a negative feedback program. Reductions in physician variance and more stabilized usage of materials per DRG could expand the usage of pre-package DRG sets in MTFs. As discussed earlier in the study, the use of pre-packaged DRG sets has the potential to

reduce costs associated with: administrative order costs, inventory carrying costs, receiving and stocking costs and inventory maintenance costs. Cost savings from these logistical areas could be substantial when compared against a \$1.3 billion annual consumable inpatient supply expenditure.

C. POSITIVE FEEDBACK PROGRAMS

1. State of Development

Positive feedback physician practice pattern programs are not well developed within DoD. There is no documented evidence of positive feedback methods in use. There is, however, an array of documentation within DoD that points out the need for this type of program.

DoD documents state that there is a need to identify the most efficient providers of care within MTFs. [Ref. 34] Modification of provider behavior is the key to control costs. Modification of physician behavior is, however, dependent upon linking clinical data and accurate cost data. The requirement to link clinical outcome data and accurate cost accounting data is also documented and recognized within DoD. [Ref. 34] The clinical outcome data needed to run a positive feedback program is available through the mandated utilization management programs being integrated now. As pointed out above concerning negative feedback systems, appropriate cost accounting data is lacking.

2. Availability of Cost Accounting Data

The need for accurate cost data is critical if positive feedback methods are to operate effectively. Average cost data does not provide the level of sophistication required to run an effective positive feedback program. Assumed or average cost data linked through a charge system does not provide the data needed either. Accurate cost data is required if individual physician's performance is to be mapped and used as feedback to affect variance reductions. Without

accurate costs captured through a defined vehicle, such as DRGs, it is not possible to compare individual providers of care. [Ref. 34] Without this comparison, it is impossible to modify the behavior of individual physicians.

3. Availability of Positive Incentive Systems

The positive incentives available in DoD are non-monetary in nature. These include favorable fitness reports and other avenues of positive reinforcement that potentially lead to promotions, in rank and job status, or extra perks such as travel to conferences.

Positive, direct incentives, especially economic incentives, are not currently available within DoD. DoD literature documents the need to profile providers of care for the purpose of providing feedback. [Ref. 34] DoD literature also points out that MTF commanders must have the ability to review appropriateness and cost effectiveness of provider decisions. [Ref. 32] No documentation was found by the author, however, identifying any development in positive, direct or economic incentives beyond the indirect reinforcements of promotions already mentioned. This lack of direct, economic incentives is not critical, however. As mentioned earlier, direct economic incentives can add value over continuous involvement of the facility's physicians and an educational and information-sharing atmosphere, but such incentives are not critical to the program's success. DoD literature documents a need for consensus building between MTF commanders and MTF physicians to meet the continuous involvement and atmosphere needs. [Ref. 32] Therefore, it would appear that DoD understands the issues involved in implementing a positive feedback program.

4. Potential Savings from a Positive Feedback Program

Simple positive methods that feed general cost data on particular ancillary services are already developed within DoD MTFs. Examples of this include Pharmacy Review Boards, which

decide which pharmaceuticals to stock based on cost-effectiveness and other direct feedback programs that provide data to physicians on which supplies are most cost-effective. [Ref. 35] Thus, additional savings under a simple positive feedback method seem small as these potential savings are already being realized.

Potential savings under a more complex positive feedback method are large, however. As documented earlier in the study, as much as 30% of the cost of high supply percentage DRGs can be reduced through an effective positive physician practice pattern program. This equates to as much as a 30% cost reduction for the highest 20% of DRGs in terms of supply cost, through Pareto analysis. This means that DoD could save 30% of 20% of \$1.3 billion or \$78 million a year. If more conservative estimates of 20% and 10% are used, annual savings could amount to \$52 million and \$26 million respectively. Regardless of the assumption used, these savings are substantial when applied against a background of rising health care costs and a shrinking DoD budget.

The above savings, however substantial, are only possible if two critical items are integrated into MTF management structures: an accurate cost accounting system and continuous involvement of the facility's physicians in a feedback program that presents data in an educational and information-sharing atmosphere.

5. Savings to other Management Areas from a Positive Feedback Program

A potential by-product of an effective physician practice pattern program is the ability to make accurate product line decisions. As seen in the negative feedback method example, accurate cost accounting data when combined with severity of illness adjusted clinical outcome data produces information that is critical to making well informed product line decisions. The same applies to positive feedback methods.

The ability to conduct in-depth regional analysis of product lines is another benefit of an effective physician practice pattern program. Future regional medical planning initiatives will need accurate DRG information to assess product line offerings within regional medical plans.

Potential benefits to materials management parallel those of the negative methods. Having the ability to purchase pre-packaged DRG sets reduces inventory carrying costs as well as the other costs already mentioned.

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

Health care costs continue to rise at alarming rates in the United States. A significant portion of these costs is the expenditure on consumable supplies required to support inpatient treatment. An effective method to control consumable supplies expenditures is that of physician practice pattern programs.

Physicians determine 70% of the total health care dollar expended. Consumable supplies are the most easily controlled portion of costs. Physician practice pattern programs attempt to reduce variation in practice patterns and thereby control the amount of consumable supplies expended per DRG, as well as other costs.

Physician practice pattern programs are not being utilized in DoD to the fullest extent possible, however. By linking clinical outcomes data with physician-specific DRG cost data, efficient physician practices can be identified and such behavior can be reinforced to control costs and maintain quality health care delivery. Benefits to product line decisions and materials management are also accrued from an effective physician practice pattern program.

B. CONCLUSIONS

1. DoD lacks the type of cost accounting system needed to support an effective physician practice pattern program. DoD currently is integrating utilization management into MTF management structures. This integration only provides half the needed pieces to run an effective physician practice pattern program. Clinical outcome data provides the MTF commander with the ability to track only clinical performance of providers. Identification of efficient providers can not be tracked as easily, however, without a link between clinical outcome data and accurate cost accounting data.

Average costs, which are used now, are not sufficient for this means. Average costs do not produce a clear picture of an individual physician's practice, nor do they provide the level of sophistication needed in accounting data to make accurate product line decisions.

Assumed costs, as used in a link with patient charge systems, is not any better than average costs. This type of system assumes away variance which is central to identifying and modifying physician practice variance.

2. DoD lacks negative incentive system standards that would support an effective physician practice pattern program. Negative incentive systems are already in place to run an effective negative feedback physician practice pattern program such as utilization management. These include unfavorable fitness reports and even dismissal. However, there appears to be no clear cut or consistent methodology for the employment of these incentives. This lack of standards could potentially lead to abuse of the system and lower quality care.

Positive incentives are less well developed within DoD. The positive incentives in place tend to be indirect in nature as in potential promotions. These incentives add reinforcement to a positive feedback program. Direct, economic incentives such as bonuses or profit sharing are not currently developed within DoD, however. This lack of defined, economic incentives does not hamper attempts by DoD to accrue the benefits that a positive feedback physician practice pattern program could provide, however, as direct economic incentives add little value. DoD does recognize the most important requirements to run an effective physician practice pattern program. These requirements are continuous involvement of the facility's physicians and that the data be presented in an educational and information-sharing atmosphere.

3. Positive feedback physician practice pattern programs offer the greatest financial benefit to MTFs. Both positive and negative feedback physician practice pattern programs provide potential benefits to effective product line decision-making and to materials management. Positive feedback physician practice pattern programs appear to offer direct savings, however.

Negative feedback methods, even when run effectively, generate almost no savings over the cost of running the program. Positive programs, on the other hand, can potentially save 30% of the consumable supplies cost in DRGs that contain a high percentage of supply cost. These DRGs are typically 20% of the total DRGs performed in a given facility. This equates to a potential savings to DoD of between \$26 and \$78 million per year. This assumes zero cost for the implementation of an accurate cost accounting system as documented earlier in the study.

C. RECOMMENDATIONS

1. DoD should continue to pursue a method to link patient-level clinical outcome data with physician-specific cost accounting data by DRG. Average costs as produced through current systems are not sufficient as an input to physician practice pattern programs. Only accurate cost data, captured by DRG, would allow DoD to run effective physician practice pattern programs to reduce variation and costs. Further research should examine the cost of implementing an accounting system of this type for comparison to the savings identified in this study.

2. DoD should formulate comprehensive negative incentive system standards. Formulation of negative incentive system standards would reduce variation in usage by MTFs thereby limiting abuse of the system and potential reductions in the quality of care delivered. These incentive system standards

should be implemented DoD-wide. Direct economic incentives are not critical to effectively run a physician practice pattern program as they lend little added value over indirect positive incentives already in place. Instead, continuous involvement by physicians and an educational atmosphere when presenting feedback data are required to run an effective program. These requirements are recognized by DoD, and when further developed, will promote clinically effective and cost efficient behavior. Future research should explore alternative negative incentive system standards for DoD.

3. DoD should utilize positive feedback methods. The current negative feedback systems provide clinical outcome data needed to run a positive feedback physician practice pattern program. When coupled with an accurate cost accounting system, a positive feedback system could provide significant savings in the form of consumable supplies reductions per DRG. Positive methods provide the most direct savings of either type of system. Further research should explore detailed installation procedures involved in integrating a positive feedback program in DoD.

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